INFORMATION TECHNOLOGY

Exploring the Electronic Future

GOAL

In partnership with the private sector, non-profit organizations, other government entities and Virginia Tech, use technology to expand community cohesiveness, to take advantage of new technological opportunities, to enhance public services, and to make Blacksburg a model community in the use of technology to improve quality of life.

BACKGROUND

Description

Blacksburg has established itself as a leader in community technology largely through its affiliation with Virginia Tech. Town leadership has recognized the potential of technology in the community and has enthusiastically partnered with the university on several initiatives – most significantly the Blacksburg Electronic Village, or BEV.

COMMUNITY TECHNOLOGY

Town of Blacksburg

www.blacksburg.gov

The Town of Blacksburg has an interesting history of technology and technological change. Blacksburg is the home of the Blacksburg Electronic Village (BEV) – and is regarded as one of the most wired communities in the world. Since 1993 Blacksburg, along with Virginia Tech, has been at the forefront of the charge to the Internet.

The town's first web site was brought on-line in 1993 in a gopher text format. It has since undergone three major revisions. The town's current web page was launched in August of 2000. This latest revision will launch Blacksburg into the age of E-government (eGov) and position it to become a model eGov community.

Technology has been applied throughout the Town of Blacksburg to improve and expand the availability of services. A few examples of Town automation include:

- The Finance Department uses an Advanced System network (AS400) for the town's enterprise financial systems and has implemented automated wireless meter reading.
- The Police Department upgraded and improved their communications and reporting systems.

- Blacksburg Transit implemented new communications and computer systems for scheduling and maintenance.

- The Planning and Engineering Department has developed a geographic information system (GIS) with web-based applications, a Neighborhood Enhancement database, and a Building Permit system.

- The Parks and Recreation Department is implementing a scheduling system to provide on-line registration for its recreation programs.

- The Public Works Department has a computerized scheduling system for their services and for fleet maintenance.

- Blacksburg has implemented a town-wide communication network that includes email, file sharing, and enhances employee information sharing.

The town's Local Area Network (LAN) and Wide Area Network (WAN) systems are the foundation for its communications network. Town Hall, the police station, and WTOB share a common LAN and form the downtown core. Satellite locations including Parks and Recreation, Public Works, Transit, and Fire and Rescue have independent LANs linked to the downtown core to form a WAN.

The Technology Department has instituted sweeping changes throughout the town's entire LAN and WAN infrastructure. This systems overhaul has modernized the town's infrastructure and better prepared it for the future. High-speed, reliable links tie the major Town facilities together. This network is the foundation necessary for E-government, which was established as a primary strategic goal by Town Council in 2000.

A core component of this network is the Internet, which will serve as a conduit for the smaller, outlying facilities such as "The Hill" Municipal Golf Course and the Price House. Telecommuting, digital broadcasting, and citizen two-way interaction with Town agencies and activities will also be facilitated.

The town initiated a trial Internet application for the community, with BEV and neighborhood leaders, in 2001 to produce three neighborhood web sites: Northside Park, Woodbine/Wyatt Farm, and Bennett Hill/Progress. These sites are intended to facilitate communication, an awareness of current local issues, and information sharing within and between neighborhoods. Each site is maintained voluntarily by an annually rotating group of residents within each neighborhood. These sites contain hot links to the town's web page as well as other community service oriented groups. This electronic forum will be expanded to other neighborhoods upon request and as funding allows.

As technology evolves so must its users. Future technologies such as wireless communications, virtual town halls, and remote-customized services are

challenges that will be embraced in the near future while always keeping in mind that the citizen's needs come first.

Blacksburg Electronic Village

www.bev.net

The concept for the Blacksburg Electronic Village (BEV) came about in early 1991. Virginia Tech had a sophisticated campus-wide voice/data network and was exploring ways to extend network access to faculty, staff, and students living in Blacksburg.

Virginia Tech, the Town of Blacksburg, and Bell Atlantic (now Verizon) have gained national and international attention by partnering to create the world's first "electronic village." Initially, the Blacksburg Electronic Village expanded the university's electronic campus to the entire community, providing residents access to the Internet.

The next two years were spent readying the town's information infrastructure by installing digital switching equipment and a fiber network. In the spring of 1993, Town citizens tested the first distribution of the BEV software, which included Internet e-mail and gopher clients. The BEV officially began operations in October 1993 initially offering only dial-up access, then adding ISDN and Ethernet in 1994 and eventually improving the software to include a full suite of Internet tools.

In 1995, local Internet entrepreneurs began offering local Internet access and BEV turned over its modem pool customers to the private sector, creating jobs and new economic development opportunities in the region. By late 1997, there were at least 24 new high-tech businesses in the Blacksburg area that provided a wide range of Internet, consulting, hardware, and programming services. In 1998, BEV turned over its residential Ethernet operations to the private sector, again creating new jobs and new business opportunities in the region.

Today, BEV works closely with the Town of Blacksburg, local civic groups, businesses, and individual citizens to ensure that new communications technologies are used to support the daily activities of Blacksburg.

Virginia Tech

www.vt.edu

As one of the top 50 research institutions in the nation, Virginia Tech has long been on the leading edge of technology. The university is becoming a model for the development and use of sophisticated instructional technologies.

New technology is transforming teaching and how students learn. Professors are discovering how instructional technology can enhance lectures, which leads to

students discovering new problem solving skills and increased enthusiasm in their studies.

The Advanced Communications and Information Technologies Center brings together communications research and teaching with research and development efforts in instructional technology. By combining these efforts, Virginia Tech has the potential to become an international center of activity in this exciting new area.

Faculty members, researchers, students, administrators, and staff members all benefit from Virginia Tech's state-of-the-art communications system. This system has nearly 2,000 miles of optical fiber and more than 11,000 data-and-voice phones linking every dormitory room, laboratory, office, and classroom to computing capabilities, audio and video data, and the massive amount of information on the World Wide Web. As a result, the entire campus has easy access to super computers across the country, worldwide libraries and data systems, and the massive information on the World Wide Web. The university is one of the most computer-saturated in the nation.

Virginia Tech also has extensive satellite linking capabilities and teleconferencing facilities that can bring the world to campus or take the campus to the world. The university uses these resources to beam interactive classes across the commonwealth and to participate in a variety of electronic forums.

Corporate Research Center

www.vtcrc.com

Virginia Tech's 120-acre Corporate Research Center, which lies adjacent to campus, has had great success fulfilling its primary mission -- building fruitful business partnerships involving the academic world, private corporations, and government. The research park joined the invitation-only international technology network, *it-parcs*, in 2001 and is the first park to receive this international designation in the United States. The CRC has over 110 tenants, consisting of private companies and research-oriented facilities that are devoted to various research areas. Technologies at the CRC include agriculture, biotechnology, design automation, diagnostics, electronics, engineering, environmental engineering, information technology, library science, materials and chemistry, and transportation among others.

Among the CRC's established objectives are the following, which relate to information technology and also reflect the town's commitment to advancing technology for the benefit of the community:

- Enhance the quality, stature and reputation of Virginia Tech by increasing corporate and government research relationships with Tech through tenancy at the CRC.

- Provide facilities and support to the university and Virginia Tech Intellectual Properties, Inc., to help bring faculty research to commercial reality and transfer technology to the private sector.

- Provide research-related employment opportunities for Virginia Tech undergraduate, graduate, cooperative students, faculty, staff, and spouses.

- Contribute to employment and economic growth in the region and the Commonwealth through the expansion of the park, development of local infrastructure to support the park, support of the Business/Technology Center, and support of university outreach initiatives with non-CRC companies and communities.

- Assist the university with its teaching mission by identifying opportunities for classes to use the CRC and its companies for classroom projects, special studies, internships, cooperative education experiences, and on-site instruction.

Businesses

www.bev.net

Among businesses using the Internet, the majority is made up of small businesses with fewer than ten employees (65% in 1995 and 1997, 58% in 1999). There is diversity in the type of business, although most are in the services sector offering retail, consulting, computer, professional or non-profit services. Most have five or more years of experience with computing (61% in 1995 and 1997; 62% in 1999). An increasing percentage of businesses have more than five computers (30% in 1995, 39% in 1997, 40% in 1999) with the majority using the Windows operating system (86% in 1995, 84% in 1997, 85% in 1999).

Most businesses report having one or two computers connected to the Internet (80% in 1995, 70% in 1997 and 52% in 1999). They use the networked computers up to 20 hours a week (90% in '95, 81% in '97 and 66% in 1999). Businesses report an increasing percentage of network computer usage between 21 to 100 hours per week (10% in 1995, 19% in 1997, and 29% in 1999). The majority has dial-up access to the Internet (75% in 1995, 67% in 1997 and 68% in 1999). The drop in dial-up access is due to businesses shifting to direct connections via Ethernet at such high speeds as 10 Megabits per second or T-1 lines at 1.54 Megabits per second.

Among the businesses *not* using the Internet, most (72%) indicate that they do not list information about their business (on the BEV Village Mall web site) because they do not use computers in their business. The remaining 28 percent report they do use computers, but they do not have a network connection. Other reasons were not a consideration for these businesses in 1995. By 1997, only six percent of respondents noted that they do not use computers in their business; 22 percent said they use computers but do not have a network connection.

Non-Profit Organizations

www.bev.net

A survey in September 1999 shows a clear trend among Blacksburg respondents of increasing usage of Internet services – most notably the Web, group discussions, and email – with local organizational affiliations (e.g., soccer clubs, church, Boy Scouts, School Band, PTA, etc.) and with members of their social networks.

Survey results indicated:

Use of the Internet to communicate with a local club or church

	1996	1999
Frequently	2%	8%
Sometimes	4	9
Occasionally	3	4
Rarely	8	13
Never	83	66

Use of Internet to communicate with local organizations

	1996	1999
Frequently	5%	11%
Sometimes	7	9
Occasionally	5	5
Rarely	11	17
Never	73	57

Montgomery County Public Schools

www.mcps.org

Montgomery County Schools Technology Vision Statement can be reviewed in its entirety at www.mcps.org/admin/technology/techplan/TOC.html.

Montgomery County Public Schools (MCPS) include technology as an integral component in its K-12 programs. The school system will provide students with the opportunity to develop lifelong learning skills through the use of technology in a relevant and meaningful setting. With technology as a tool, the teachers, administrators and support staff will become more efficient and effective in facilitating and managing the learning environment.

Montgomery County Schools Technology Mission Vision Statement

The mission of technology in Montgomery County Public Schools (MCPS) is to ensure that all students have the opportunity to develop lifelong skills necessary to be productive citizens in an information-driven society. This will be accomplished

through the acquisition, integration and evaluation of technology in the content areas.

MCPS believes that new technologies will change dramatically the ways in which students will live and work in the 21st century; therefore, schools need to change today to provide the types of technologies that students need to face this future successfully. Educators and students will need to have access to a variety of information sources to utilize national and international networks. Students must be empowered to use technology for continued learning.

The Montgomery County Public Schools' WAN was established in conjunction with Blacksburg Electronic Village as part a 1994 grant from the National Science Foundation.

The individual sites are configured for connection to the Wide Area Network as follows:

MCPS Wide Area Network Infrastructure

School	Connection
Blacksburg High School	T-1 frame relay
Blacksburg Middle School (BMS)	T-1 frame relay
Margaret Beeks Elementary	Bridged ISDN connection thru BMS
Gilbert Linkous Elementary	Bridged ISDN connection thru BMS
Harding Avenue Elementary	Bridged ISDN connection thru BMS
Kipps Elementary School	Bridged ISDN connection thru BMS

Figure IT-1, MCPS Wide Area Network Infrastructure

Access to the Internet is obtained through a point-to-point T1 line with The Blacksburg Electronic Village. User accounts on the system were established for all teachers and students. The school district Internet browsers are all configured to log users onto the proxy filter to obtain Internet services. A firewall is used to provide security for the WAN.

Each individual school site has a dedicated directory on the web server that is enabled for FTP services. Schools update and maintain their own web sites on a district server.

All employees of Montgomery County Public Schools have e-mail services. A separate student E-mail server was also established in the summer of 1998.

One major focus of Montgomery County Public Schools begun during the 1995-96 school year was the construction of Local Area Networks for each building. The process of constructing LANs in the schools began with the cooperation of external vendors and was completed in-house as MCPS staff became qualified.

Currently all classrooms are wired to local networks which are connected via a WAN to the Internet.

Another primary goal of the technology plan was to develop an action plan for using telecommunications effectively in the Montgomery County Public School System. Specifically, the school system was to expand its plan for increased use of telecommunications by adding two secondary school sites for interactive broadband delivery of distance learning programs.

Two interactive-video classrooms (four-way, interactive, continuous view, DS3 technology) have been installed and are currently used at Christiansburg and Shawsville High Schools. Funding arrangements are under negotiation for the addition of a dedicated broadband feed and video distance learning lab at either Auburn or Blacksburg High School.

Public Access in Blacksburg

Montgomery-Floyd Regional Library
http://www.mfrl.org/

The Blacksburg Branch of the Montgomery-Floyd Regional Library was just awarded a Gates Foundation grant in the Fall of 2000. This lab should be up and running by the summer of 2001. This will give the Blacksburg community a 10-computer training facility for use by the general public. In addition, the library has several personal computers with Internet access available for general public use.

BEV Senior Computer Learning Center (SCLC)
http://civic.bev.net/seniors/sclc/sclc.html

The SCLC is a project of the Blacksburg Electronic Village (BEV) Seniors Organization for the Blacksburg Senior Center, a division of the Town of Blacksburg Parks and Recreation Department. Senior citizen volunteers staff this Computer Learning Center during Senior Programs Open Time, Computer Classes, and by special appointment. The lab is made available to teens during the day to encourage and enable computer access. Check with the community center staff for available hours.

Since 1997 the SCLC has offered individual instruction (Open Time) each Monday (1:30 PM - 4:30 PM) and Thursday (9 AM - 12 Noon). In addition, computers classes have been held for fourth graders, senior citizens and Town employees, and the AARP Income Tax Assistance Program and Online Banking Instruction have been available. Computer shoppers can obtain literature and impartial advice.

Current Senior Programs Computer courses (scheduled in the SCLC for Fall 2000) are Computer I: Beginning Computer Essentials; Computer II: Introduction to Internet and Email; Beginning Word Processing and Computer III: Advanced Internet. Specialized workshops are held to meet needs. The SCLC has a dozen computers, nine of which have Internet access via a donated NetAccess Digital Subscriber Line (DSL) service, and one computer by an Adelphia PowerLink cable connection.

Other
The Town of Blacksburg Parks and Recreation department offers computer camps for kids. These programs are usually conducted at the Blacksburg Middle School.

Private Residences

www.bev.net

An estimated 81 percent of Blacksburg residents use the Internet. Of this number approximately 65 percent are using some form of broadband technology for connectivity. Broadband services would include, but are not limited to:

- Cable modem
- Digital Subscriber Line (DSL)
- ISDN
- T1 or greater
- Wireless
- Satellite
- Ethernet

All of these technologies offer varying advantages and disadvantages, costs and limitations.

The majority of broadband users are students living in apartment complexes around Town. Apartment complex owners are offering these "must have" services to attract Virginia Tech students.

Town residents living in single-family residences are challenged by not having many options for inexpensive broadband. They can choose cable, ISDN, DSL - if it is available to them. This is the major challenge for the town – getting affordable broadband connectivity to all areas of Town.

- An increasing percent of respondents with children in school reports using the Internet to communicate with their child's teacher (up from 9% in 1996 to 37% in 1999). An increasing percentage is using the Internet to get information more frequently from local schools.
- Home computer ownership, Internet penetration, and computer and network literacy have been consistently higher among the Blacksburg population than national averages.

- The majority (89%) of Internet users in Blacksburg and Montgomery County are affiliated with Virginia Tech.
- Eighty-one percent of Blacksburg residents report using the Internet.
- An estimated 20 percent of Montgomery County residents outside Blacksburg use the Internet.

TELECOMMUNICATIONS PROVIDERS

Description

Figure IT-2 is a brief list of non-exclusive communications providers for the Town of Blacksburg in 2001, and indicates services offered as well as services to be offered in the future.

The breakup of the American Telegraph and Telephone Company (AT&T) in 1994 resulted in intense competition for local and long distance telephone services, along with data services. Today, a single company rarely provides all the telecommunications services currently available on the market to an organization. In Tier III markets such as Blacksburg, there are typically less communications services and service providers. The Town of Blacksburg strongly encourages competition among service providers to better provide superior telecommunications service and products to its citizens.

Blacksburg Telecommunications Providers in 2001

Telecommunications Providers	Voice	Cable TV	ISP	Cellular	Data Dialup	Data Cable, DSL, ISDN	Data T1 and Higher	Wireless ISP	Cellular Data
KMC	c					c	c		
Verizon	c		c	c	c	c	c		c
Adelphia		c	c	f		c			
NetAccess			c		c	c	c		
Suncom / ATT				c					c
US Cellular				c					c
Ntelos	c		c	c	c	c	c		c
Citizens Internet	c		c		c	c	c		
Sprint PCS				c					c
IPlus Internet Services			c		c	c			
Pulaski Networks	c		c		c	c	c		
Rev Net Technologies			c		c	c	c		
Surf with Us			c		c	c			
Blacksburg.net			c		c	c	c	f	

c = currently offered service
f = future service

Figure IT-2, Blacksburg Telecommunications Providers in 2001

Communications Providers

KMC
www.kmctelecom.com

KMC Telecom is a fiber-based integrated communications provider offering data, voice, and Internet infrastructure services to businesses, governments and other institutional end-users, Internet service providers, long distance carriers, and wireless service providers. KMC's business has two distinct components: serving communications intensive customers in markets with populations between 100,000 and 750,000, referred to as Tier III markets, and providing data services on a nationwide basis.

nTelos (formerly R&B Communications)
www.ntelos.com

NTELOS Inc. is a leading digital wireless PCS provider in the mid-Atlantic region, coupling wireless services with an integrated communications strategy that also includes local telephone services, Internet and high-speed data access. With an extensive fiber optic network and a PCS license area covering more than 11 million people, NTELOS is positioned to bring the next generation of communications services to the region. Voice, data, messaging and information services are delivered to the customer in a way that allows for movement, flexibility and personalization.

Currently, the robust NTELOS digital CDMA wireless network spans the states of Virginia and West Virginia as well as parts of Kentucky and North Carolina. With a heritage that dates back more than a century, NTELOS is committed to providing value-added communications services and outstanding, personalized customer care.

Triton PCS
www.tritonpcs.com

Triton PCS, the first member of the AT&T Wireless Services Inc. network of affiliates, is licensed to build and operate a digital wireless network in a contiguous area covering 13 million people in Virginia, North and South Carolina, northern Georgia and northeastern Tennessee and southern Kentucky. The company is marketing its wireless services under the brand SunCom, a member of the AT&T Wireless Network and is providing digital service in one of the nation's largest regional territories, spanning from south of Washington, DC to east of Atlanta, Georgia.

U.S. Cellular Corporation
www.uscellular.com

Based in Chicago, U.S. Cellular Corporation is the nation's eighth largest wireless telecommunications provider. Since its founding in 1983, U.S. Cellular has grown to provide wireless service to more than 3 million customers in 145 markets in 25 states.

U.S. Cellular has primarily chosen to provide wireless service to mid-sized cities and small markets, and has enjoyed tremendous financial success because of this strategy. In 2000, U.S. Cellular reported an impressive 18 percent increase in its customer base, adding a total of 483,000 new customers, making it one of the fastest-growing wireless companies in the nation.

Verizon
www.verizon.com

Verizon Communications, formed by the merger of Bell Atlantic and GTE, is one of the world's leading providers of high-growth communications services. Verizon companies are the largest providers of wired and wireless communications in the United States, serving the equivalent of nearly 95 million access lines and 25 million wireless customers. Verizon is also the world's largest provider of print and on-line directory information. Verizon currently provides 97 percent of the local residential and business telephone service in the commonwealth.

Internet Service Providers
This is a class of private companies that provide access and Internet and additional fee based services. There are many ISP's for this area and a more complete listing of Internet Service Providers is located on the BEV Seniors web site: www.civic.bev.net/seniors/isp.

Blacksburg.Net
www.blacksburg.net

This is a local Internet Service Provider (ISP), with headquarters in Blacksburg, offering connectivity and data services to the region. This company offers dial-up Internet access, high-speed data transmission, dedicated data lines for businesses, co-location of web servers, and Internet domain name registration services.

NetAccess
www.naxs.com

This nTelos Communications subsidiary provides a variety of Internet connectivity options for business and residential customers including 56k dial-up, ISDN, DSL and numerous other high speed and e-commerce applications.

Cable Service Provider(s)
Adelphia Communications
www.adelphia.com

Blacksburg is currently provided cable service by Adelphia Communications, the sixth-largest telecommunications provider in the nation. Adelphia is in the process of completely rebuilding its cable infrastructure throughout Virginia. By 2002, all of Adelphia's service areas will have the most sophisticated fiber optic cable technology available, operating at a minimum capacity of 750 megahertz with the possibility of 860 megahertz or greater. Digital compression will allow for a broader use of this high bandwidth capacity.

This state-of-the-art technology will allow Adelphia to offer its customers high-speed Internet access service (Power Link), and expanded cable television programming through Adelphia Digital Cable. Adelphia has also branched out into the telephone business with the introduction of long distance service and has begun to develop a line of "wireless" products, beginning with PageTime, a personal paging service. Anticipated future products include local telephone service, video-on-demand, and interactive television.

CURRENT TECHNOLOGIES

The Internet
Since its inception in 1993, the Internet has grown rapidly in use – both locally and worldwide. The Internet is entering almost every facet of life – home, work, government, school, and recreation. It is becoming the normal medium of communication.

Many of today's technologies are converging to the Web. Data communications (VPN, electronic mail); telephony (Internet Protocol [IP] telephones); entertainment (Real Audio, live broadcasting); wireless personal data assistants [PDA] and computers; and cellular telephones are a few examples.

Researchers at Virginia Tech are working on the next generation of the Internet – the Internet 2. This is a more robust version of the existing Internet with the primary goals of providing higher bandwidth and more intelligent routing of data.

The major communications companies consider the Southwest Region of Virginia as a Tier III region. This presents serious challenges and limitations for a community that has ambitious goals with regard to Internet connectivity and technology.

Wireless Communications

Wireless technology is rapidly expanding into many applications. Some of the traditional wireless applications have been for voice communications (e.g., cellular phones) and paging. Wireless technology is used to network computers, to allow remote monitoring and data acquisition, to provide access control and security, and many other applications. Wireless technology is an ideal solution for environments where wires simply are not possible, such as in passenger vehicles and for hand-held devices.

Most wireless products can be categorized by application, some of which include the following:

Figure IT-3, Cellular Telephone

- **Voice and Messaging:**
  Cordless phones
  Cellular phones
  Beepers, pagers, and messaging systems
  Wireless e-mail systems
  CB Radio
  Commercial two-way business radios
  Intercom systems

- **Computer Networking:**
  Wireless Local Area Networks (WLANs)
  Infrared (IR) ports on computers, printers, and other devices
  Radio modems

Figure IT-4, PDA

- **Remote Data Acquisition:**
  Personal Digital Assistants or palm computers (PDA's)
  Radio Frequency (RF) modems

- **Commercial Home Products:**
  Security and access control
  900 MHz stereo distribution
  Temperature control systems
  Remote control
  Keyless entry systems
  Garage door openers
  Remote Controlled toys
  TV remotes
  Global Positioning Systems (GPS)
  Aviation navigation
  Nautical navigation
  Roadway navigation
  Radio Frequency Identification technology (RFID)

Figure IT-5, Handheld GPS Receiver

Tags and readers - Inventory Control, Animal migration/tracking
Smart cards-
Access control, identification, debit cards
Merchant RF security tags

Figure IT-6, Smart Card

Electronic Government (eGov)

Electronic Government (E-government or eGov) is a how governments deliver services to its citizens using technologies such as telephone, the Internet and other telecommunications means. As citizens become increasingly connected electronically, more demand is being placed on governments to provide their services via the Internet or other information technologies.

The Town of Blacksburg currently uses it web site, www.blacksburg.gov, to disseminate information to its citizens and stakeholders. Some examples of the information currently available through the site include contact information, community calendar, town documents and publications, employment opportunities, GIS, hot topics, services, and many others.

Town staff is undergoing strategic planning for the next phases of eGovernment services. It is important to realize that this is a dynamic process and will continually be assessed, revised and improved.

Geographic Information Systems

A geographic information system (GIS) is a computer-based tool for mapping and analyzing large amounts of information with pictures and maps. GIS technology integrates common database operations such as query and statistical analysis with the visualization benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes, and planning strategies. Information can be inputted, stored, updated, retrieved, manipulated, analyzed, and displayed graphically or pictorially by the user.

Town employees use GIS for the rapid retrieval of information regarding properties and assets in Town and as a vital tool for analysis, planning, decision-making, and problem solving within the community. The town GIS systems are used to enhance customer services and are available on-line at www.blacksburg.gov and by selecting the Map / GIS link on the home page.

Opportunities

- Virginia Tech, the town's largest corporate citizen, is a source of cutting edge technology and offers the potential for collaborative projects.
- The presence of the Blacksburg Electronic Village offers the opportunity for cooperative community technology projects.
- The Virginia Tech Corporate Research Center is growing at a healthy rate and supports companies in the computer technology, biotechnology, and wireless communications fields, among many others.
- The Town of Blacksburg has been recognized internationally as a leader in connecting members of the community to one another, and to the world via the Internet.
- The community has a high adoption rate of new technologies.
- Local commercial and retail activity is expanding as a result of the technology opportunities provided by the Internet.
- WTOB/Channel 2 is a communication resource that can be expanded to enhance training and information opportunities throughout the community.
- There is a growing presence of broadband infrastructure in the community due to a desire of Town citizens for high-speed communications.
- The town places a high priority on utilizing technology to improve customer service and internal process efficiency.
- Cable television service is available to all areas of Town and Adelphia is completing a comprehensive upgrade to increase system bandwidth.

Challenges

- While the community is highly connected, a "digital divide" still exists and many households cannot afford computers and Internet connections.
- Affordable broadband access is only available in selected apartment complexes and fiber-optic technology to the home is not available.
- Insufficient resources are available to assist citizens and non-profit organizations in producing public-access programs for WTOB/Channel 2.
- Regional technology initiatives are not in place to enhance intergovernmental data sharing.

- Issues of security, privacy, and identity authentication are of critical importance as the town begins implementing E-government initiatives.

- Although demand for wireless communication services is high, telecommunications towers (although not antennas) are difficult to locate and often create conflicts between citizens and wireless providers.

- Because of Blacksburg's small market size (Tier III) and relatively rural location, telecommunications companies are slower to provide new services and technologies.

- Citizen expectations for on-demand service delivery are increasing, particularly as E-commerce becomes more prevalent.

- Many wired utilities, such as telephone, fiber, and cable services, are currently located above ground.

- Although the franchise is non-exclusive, there is currently no competition in Town for the provision of cable television services.

- The primary telecommunication and cable franchises are not locally owned and are not perceived by citizens as partners in community technology initiatives.

- Fiber optic lines will be needed to most home and business locations within five years.

- Digital Subscriber Line (DSL) and 2-way cable modem services are still in early stages of deployment and do not adequately support multimedia and 2-way services.

What is Changing

Wireless Trends

The Gartner Group, one of the world's leading research institutions, estimates that by 2004 wireless devices will initiate at least 40 percent of business-to-consumer E-commerce transactions outside North America. If true, wireless E-commerce will dramatically increase.

Other indications that this trend towards wireless growth will continue:

- One of the world's largest handset manufacturers, Ericsson, believes about 50 million handsets with Internet access will be sold by the end of 2001. These are the new generation of handsets with the Wireless Application Protocol (WAP) microbrowser. The company anticipates 400 million mobile Internet users in 2004.

- The Strategis Group anticipates 14.3 million wireless data subscribers in 2003 and 21.5 million in 2004.
- Generation 3 (G3) – Within five years Blacksburg will see the next generation of wireless technology, approximately two years later than many Tier 1 and Tier 2 markets.

These examples indicate that growth in wireless networking will explode. This is also demonstrated currently with the 802.11b technologies. This is an unlicensed frequency band of 2.4 gigahertz and does not require Federal Communications Commission (FCC) approval. Technical limitations keep the 802.11b network throughput to approximately 11 megabits per second (Mbps) in optimal conditions. The emergence of 802.11a wireless devices will happen soon. The significant advantage of 802.11a will be the increased speed capacities from 11 Mbps to 55 Mbps.

Dial up connectivity will also increase in speed in the next few years to 144 kilobits per second (Kbps), from the current 56.6 Kbps. This will be the connection rate of most wireless computing devices such as cellular telephones and PDA's.

Convergence

The joining of the various technologies such as cellular phones, web browsing, email, and network connectivity illustrates the phenomena of convergence. This is a major challenge for wireless and wired carriers alike is how to serve customers in an increasingly convergent global marketplace where most major carriers desire to offer a bundle of products. Convergence affects every aspect of modern telecommunications, including product development, technology, government regulation, marketing, and customer service.

Some examples of convergence are:

- Computers and telephones integrated into one unit
- Cellular telephones and PDA's
- Cellular telephones and smart cards (e.g., to buy a vending machine drink with your cell phone)
- Computers and GPS devices in automobiles
- Cameras, GPS locators, and cellular telephones built into wristwatches

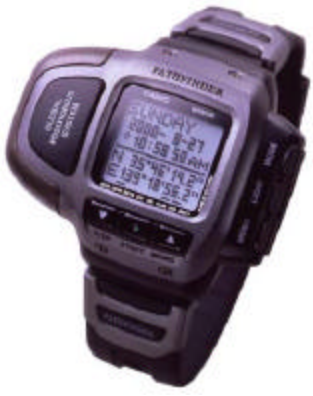

Figure IT-7, GPS Satellite Watch

Now technologies such as telephony (telephone–computer integration), multi-channel cable television, and personal computing are increasingly interrelated. Whether re-seller, operator, or manufacturer, one company may be working on expanding its markets in all three of the above-mentioned areas and worried about how active it should be in protecting its current market.

E-government in Blacksburg

Government will change more in the next decade than it has in the past century, due to the implementation of E-government. E-government is already generating changes to existing laws, and creating new laws and policies. Experts predict that it will change the way government is organized. Implemented properly, E-government has the potential to enhance a government's relationship with its citizen/taxpayers by improving and expanding government services while making them more accessible to a greater number of citizens.

The world economy is transforming from an industrial base to knowledge and information base. In this transition, government must protect the economic interests of its citizens while re-engineering its functions and services. Government is both a service provider and a policy-maker, protecting the public health and safety of all citizens and promoting the social and economic values espoused by its citizens. As a policy-maker, government should consider planning for a digital society as a whole. Electronic government is only a part of this role. For example, the government must be a role model in the use of E-commerce and a catalyst in bringing the digital society to its citizens.

The future method of communicating with the government will be on-line, not in person. Citizens will want information services available 24-hour a day, everyday, throughout the year. Citizens will demand one-stop shopping were they take care of all their government services – be it local, regional, state, or federal.

E-Government (eGov) services for the Town of Blacksburg will be brought on-line in a phased approach. Initially one or two key services will be implemented. In the future many of the services currently provided by the town will be available through the Internet. This will be done, as it becomes practical and economically feasible. Some of the anticipated eGov services are: utility billing, auto registration, purchasing and registration of various licenses and permits, payment of fees and fines, community and neighborhood user groups, registration and payment for recreational programs, and problem reporting (e.g., potholes, fallen trees, etc.). Technology will not replace the town's citizen orientation to provide personal and responsive service. Rather, technology will augment government services allowing us to better respond to the needs of the community as well as to provide new and more effective services.

Blacksburg must be ready to use technology developments that have yet to be envisioned. These new developments will emerge in the near future and the town must continually examine policies and facilities to make sure it remains in step with technological innovations so that citizens have access to the best services available.

How people work, learn, shop, communicate and interact
It is commonplace, and expected now, to obtain and distribute information via the Internet. Examples are sending documents by email and browsing web sites for information and research. Professionals are demanding email and electronic forms of information exchange. As well what is expected is high-speed access to information. As students and citizens come from more technologically advanced areas – they will expect and demand similar services.

Pace of change in technology
The pace is only accelerating. Changes within the next 5 years: miniaturization of computers and the expanded use and growth of PDA type devices; voice recognition systems making keyboards obsolete; growth of IP Telephony and the replacement of traditional telephone services with the Internet; and explosion in wireless technologies – networking, communicating. There will be a huge demand for on-line and wireless services. Wireless services such as cellular will have a huge impact on individual lifestyles. There will be increased demand for cell tower transmitters as the capabilities of cellular handsets and PDA's increase.

The demand from citizens will increase as price decreases and features "we can't live without" increase. It will be a challenge for the town and the university to partner together to provide the required technological infrastructure for the future.

Decreasing wait time for delivery of services and customization
Everyone wants it "now" as the world enters the age of around the clock service. Citizens will want to access Town services at their convenience – when and how they want to. They will insist on defining their experience, not the civil employee down at Town Hall. They will demand the ability to customize services – e.g. the ability to pay for services monthly, quarterly, etc. As technology progresses citizens will demand increased customized, personalized services.

Demand for more speed – broadband vs. analog
The average experienced computer user is frustrated with dial-up connectivity and it's limitations. The key for small communities like Blacksburg will be to have enough competition in the market. There is much consolidation occurring in the ISP arena. One of the roles of government in Tier III markets will be to entice private enterprise to offer cost effective services to citizens.

Digital entertainment services, along with all the other digital services, have a good chance to become the "must have" service that the masses will select once computer networks have adequate bandwidth (e.g., Fast Ethernet and Gigabit Ethernet). Competitors in other regions are already installing these networks.

Virginia Tech and the Town of Blacksburg are competing with others around the world. The major business in town, the university, could become less competitive and lose business to competitors if the town and university do not see to it that the latest communications technologies are provided to students, faculty, and staff off-campus, as well as on-campus. This means that services such as Fast

Ethernet and Gigabit Ethernet with full multimedia services need to be delivered to everyone at affordable rates. Fiber optics, broadband wireless, and NGI switched networks are necessary mechanisms. Gigabit/second, or faster, speed communications should displace the 10 Mbps Ethernet and lower speed access in use today to enable full multimedia services for business, entertainment, education and other over applications.

WTOB Channel 2: Public and Government Access Television
WTOB is moving into the area of digital video production. Digital photography and editing capabilities are becoming the norm among public and government access stations, and WTOB is focused on being part of that cutting edge transition. The future of the station is to be fully digital capable, which will allow for greater productivity and professional quality productions. In accordance with Town Council's strategic goal of E-government technology, WTOB will offer digital streaming video on demand through the town's web site.

GENERAL POLICIES

- Focus on interactions among people, businesses, industry, governments, educational institutions, and non-profit groups rather than on technology.
- Continue to be a leader in local government and community technologies.
- Promote regional cooperation in information technology to facilitate government-to-government transactions and exchanges of data.
- Encourage electronic commerce in Blacksburg.
- Increase access to information technologies to all members of the community.
- Expand the capabilities and utilization of WTOB/Channel 2, including for emergency communications.
- Continue to expand the Geographic Information System to facilitate E-government initiatives in providing convenient, user-friendly access to Town information.
- In partnership with Virginia Tech and private enterprises, facilitate the implementation of the best available communication infrastructure townwide that allows high-speed and simultaneous voice, data, and full-motion video communication and information.
- Encourage competition among telecommunication providers.
- Continue to be proactive in the design and siting of wireless telecommunication facilities.

- Encourage the underground placement of all existing wired facilities.
- Create partnerships with technology companies to provide affordable services that are beneficial to the community.
- Use technology to improve internal processes and customer service.

ACTION STRATEGIES

in general

- The town holds streets, rights-of-way, and public utility easements in trust for the use of the public, which are finite assets that interest multiple users.
- The value of rights-of-way as a public asset has increased, especially as more telecommunications providers have become interested in serving Blacksburg residents. The town has an obligation to charge fair compensation for the use of this asset.
- The town has the duty to manage its rights-of-way and easement assets wisely for the public good. This includes, but is not limited to, adopting reasonable regulations for utility separation, the timing and coordination of the work in the right-of-way, safety rules and regulations, and the preservation of the streets in a condition to best serve the traveling public.
- Facilitate the placement of all utilities underground throughout Town.
- Continue to enhance the computer network in the town government organization.
- Continue to leverage technology for improving town services
- Continue the development and maintenance of the Geographic Information System (GIS) and expand its use for all Town departments, for citizens, and corporate users.
- Improve the utility of Town information through discussions with users, such as opportunities for electronic dialogue between citizens and Town officials.
- Participate in cooperative projects with Virginia Tech, governmental entities, and private enterprise.
- Continue to include wireless technologies for inclusion in Town technology and service initiatives.
- Create partnerships with telecommunications companies to provide broadband access to under served areas.

within 5 years

- Establish a neighborhood pilot program to advance the BEV experiment that will enable the town to remain a leader in information technology.
- Establish broadband service to and within the Blacksburg Industrial Park.
- Support the development of a "technology park" to allow for incubator or related businesses, generally associated with the Corporate Research Center, to expand within Town.
- Create a virtual business incubator to encourage local businesses to conduct business over the Internet.
- Provide public computer terminals in Town Hall, the community center, and other frequently visited public spaces.
- Acquire state-of-the-art digital equipment for WTOB that allows staff to create more professional productions, to enhance local programming, and to better train local producers.
- Expand the capabilities of WTOB to become an on-line, on-demand public access television station.
- Implement on-line payment for critical Town services.
- Encourage active participation and financial support of WTOB by the cable franchisee(s).
- Seek additional cable television service providers to promote competition.
- Develop Enterprise GIS for all internal departments to allow easy, convenient access to multi-department program information and enhance customer service delivery.
- Enhance the utilization and capabilities of the on-line GIS to allow for two-way exchange of data with customers.
- Facilitate the creation of community technology centers allowing public access to technologies that may not be available in the home.
- Create a regional government technology user's group to enhance government-to-government data sharing.
- Create government-to-government connections between information systems in Montgomery County and at the state level.
- Continue the transition towards paperless communications with Town Council, the Planning Commission, and official town committees.

- Use technology to improve common internal processes and move toward an on-line, paperless environment where applicable.
- Use technology to promote Town culture and history with a virtual museum.
- Acquire technologies to enable the broadcast of committee meetings over the web.
- Provide the capability for on-line virtual Town Hall meetings.
- Facilitate the installation of fiber-to-the-home and broadband wireless technologies.
- Connect all Town facilities with fiber optic cable.
- Establish a fiber optic network by installing fiber conduit in Town rights-of-way.
- Establish a permanent computer training facility for town employees.

within 25 years

- Facilitate the creation of the first "wireless village."
- Create a three dimensional interactive GIS where individuals can relate to geographic information and associated data in three dimensional, virtual space.